Remarks

The present application had claims 1-19 pending. Applicants have herein amended claims 1, 3, 4, 6, 7, 8, and 11-16 and have cancelled claims 9 and 10 and have added new claims 20 and 21. Accordingly, claims 1-8 and 11-21 are currently pending. Claims 11-16, although pending and amended herein, presently stand withdrawn from consideration; reconsideration of the withdrawn status of these claims is hereby requested for the reasons set forth below.

Support for the claim amendments and new claims 20 and 21 may be found throughout the application, including the previously pending claims. Specifically, support for:

claim 1 amendments may be found in originally-filed claim 6;

claim 3 amendments may be found on page 7, line 14, of the specification;

claim 4 amendments may be found on page 9, lines 20-22, and on page 9, line 31, of the specification;

claims 11-16 amendments may be found in originally-filed claims 11-16;

new claim 20 may be found on page 6, lines 14-16, and on page 9, lines 24-26, of the specification;

new claim 21 may be found on page 10, lines 20-23, and previously pending claim 10.

Applicants maintain that no new matter has been added by the amendments or by the addition of new claims 20 and 21.

In the July 13, 2006 Office Action, the Examiner indicates that the originally-filed claims are subject to restriction between claims 1-8, drawn to a process for applying a catalyst ink to a substrate, and claims 9-19, drawn to a device for application of catalyst

inks. The Examiner also indicates that claims 9-19 are withdrawn from consideration as being directed to a non-elected invention.

Applicants acknowledge the non-election for prosecution in the present application of the claims directed to devices for application of catalyst inks – i.e., claims 9 and 10. Accordingly, claims 9 and 10 have been cancelled herein. The cancellation of claims 9-10 is done without prejudice to Applicants' ability to pursue patent protection for these claims in a later filed continuation and/or divisional application.

Applicants note, however, that the remaining withdrawn claims are not directed to devices for application of catalyst inks. Rather claims 11-16, as amended herein, are directed to catalyst-coated membranes, catalyst-coated gas diffusion substrates, catalyst-coated polymer films and membrane-electrode-assemblies that directly or indirectly comprise the catalyst-coated substrates produced by the processes of claims 1-8. Claims 17-19 are directed to methods of using the claimed membrane-electrode-assemblies.

Applicants maintain that the withdrawal of claims 11-19 from consideration in the present application is inconsistent with the restriction requirement. Thus, Applicants respectfully request reconsideration of the withdrawal of these claims. Alternatively, Applicants request inclusion of claims 11-16 with claims 1-8 for examination in the present application since claims 11-16 each requires the presence of the catalyst-coated substrate produced by claims 1-8. Claims 11-16 are closely related and intertwined with the substrates of claims 1-8 and should be examined together.

In the July 13, 2006 Office Action, the Examiner rejected claims 1-8 under 35 U.S.C. § 102(e) over Starz, et al. (U.S. Patent No. 6,500,217). Applicants disagree with the Examiner's position.

Starz, et al discloses catalyst inks which comprise an electrocatalyst, an ionomer and water, and teaches the adjustment of a certain water content of the membrane in the printing process. The controlling of the water content of the membrane in a range of 2 – 20 wt % is necessary for optimum alignment of the front and back print. However, in Starz, et al., the adjustment of the membrane water content is done prior to the printing process. This is supported by the fact that the soaking bath 18 is inserted into the coating line upstream of the printing station (see column 4, lines 64-66, and figure 5). The treatment of the membrane in a humid atmosphere is disclosed to be an alternative for the soaking bath (see column 5, line 4: "alternatively, there is the possibility..."). This alternative has to be performed equivalent to the soaking bath -- that is, prior to the printing process.

Starz, et al. does not disclose the coating of the membrane while under a controlled humidity. No teaching is given how to conduct the treatment of the membrane in a humid atmosphere, while several details are given for the soaking bath (e.g., col. 6, line 16-26).

The controlled atmosphere in the present invention is not used for adjustment of the membrane water content. It is used to overcome the drawbacks when printing with water-based inks (short screen life, viscosity increase, screen clogging, etc. – see e.g., page 4, lines 5-11). The inventive process disclosed in the present application is applicable to a variety of substrate materials other than membranes (e.g., CCBs, tapes, films, etc. -- see page 5, line 1-3).

Furthermore, as required by amended claim 1, the present invention has the following features:

- A coating step under controlled atmosphere;
- A leveling step under controlled atmosphere; and
- The coating and leveling steps occurring in different compartments/sections.

Starz, et al. is also silent towards any leveling step. The electrode layers in Starz, et al. are dried immediately after the printing operation (see column 3, lines 9-11). There is no required leveling step prior to drying.

Thus, amended claim 1 and its dependent claims are not disclosed or anticipated by the teachings of Starz, et al.

Moreover, the Starz, et al. reference fails to address or solve the problems overcome by the present invention. As pointed out in the present specification on page 4, lines 4-11, water-based inks run dry very quickly on the screen, the print quality is affected, poor leveling occurs, and weak adhesion results. The present invention solves this problem by combining the coating and leveling steps to provide the manufacture of smooth, uniform catalyst layers with very low surface roughness (see the specification page 7, lines 1-2). With the practice of the present invention, the print deposits of the ink in the leveling compartment are leveled and smooth, continuous catalyst layers are formed (see page 11, lines 28-29, and example 1). Starz, et al. does not teach or suggest this solution for water-based inks running dry quickly on the screen and causing print quality problems, poor leveling and weak adhesion.

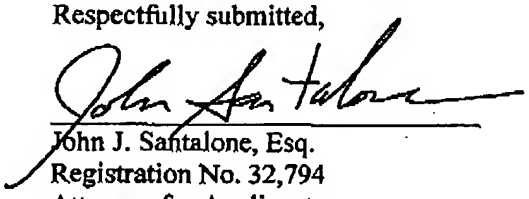
With respect to claim 3, it should also be noted that glycerol is an organic solvent, not a surfactant as alleged in the Office Action. Glycerol has a very high boiling point of 290°C; therefore, the vapor pressure of glycerol is very low. According to the literature (CAS Number 56-81-5, OECD SIDS publication enclosed), the vapor pressure is 0.000106 hPa = 0.0106 Pa at 25°C. Thus, the vapor pressure is outside the specified range of 1-600 Pascal.

In consideration of the above amendments and arguments, Applicants respectfully request that the rejections under 35 U.S.C. §102(e) be reconsidered and withdrawn, and that the present application be placed in condition for allowance.

No fee is believed to be due with respect to the filing of this Response, other than the fee for the three-month extension of time, which has been authorized to be charged to Deposit Account No. 11-0171. If any additional fees are due, or overpayment has been made, please charge, or credit, Deposit Account No. 11-0171 for such sum.

If the Examiner has any questions or comments regarding the present Response or the subject application, the Examiner is cordially invited to contact the Applicants' attorney at the number provided below.

Respectfully submitted,



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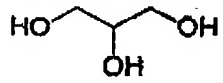
SIDS Initial Assessment Report

1 IDENTITY

1.1 Identification of the Substance

CAS Number: 56-81-5
Chemical Name: 1,2,3-Propanetriol
Molecular Formula: $C_3H_8O_3$
Structural Formula:



Molecular Weight: 92
Synonyms: Glycerol; glycerine; glycerin; glycyl alcohol; trihydroxypropane, 1,2,3-trihydroxypropane; Citifluor AF 2; Glycerin mist; Glyceritol; Clyzerin, wasserfrei (German); Grocolene; Moon; Osmoglyn; Star

1.2 Physico-Chemical properties

Glycerol (CAS no. 56-81-5) is a liquid at room temperature having the following physical–chemical properties and characteristics, which have been obtained from various reference sources (see the IUCLID dataset for further details).

Table 1 Summary of physico-chemical properties

PROPERTY	VALUE
Physical form	Liquid
Purity	95 – 99.5% (water as an impurity with trace levels of polyglycerol)
Melting point	18°C
Boiling point	290°C at 1013 hPa
Relative density	1.26 at 20°C
Vapour pressure	0.000106 hPa at 25 Deg C (calculated) and 0.0033 hPa at 50°C (measured)
n-octanol –water partition coefficient	log K_{ow} - 1.76
Water solubility	Miscible
Dissociation constant	0.07E-13
Flash point	160°C
Autoflammability	393°C
Viscosity	1410 mPa s at 20°C
Surface tension	63.4 mN/m at 20°C

For vapour pressure a measured value at 50°C is available. At this temperature vapour pressure is very low. It is expected that at room temperature this value will even be lower. This is confirmed by

model calculations with the Syracuse programme (EPIWIN vs 3.04) indicating a vapour pressure of 0.000106 hPa at 25°C. This value is used in model calculations.

Model calculations on the octanol-water partition coefficient differ by about one order of magnitude (see IUCLID dataset). Since a measured value of Log Kow = -1.76 is available, this has been selected as the key value. This measured value is supported by a QSAR prediction using KOWWIN version 1.66, predicted Log Kow = - 1.65.